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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MING LI and MITSUHIKO KIMOTO

Appeal 2009-003446
Application 10/812,113
Technology Center 3700

Decided: June 17, 2010

Before WILLIAM F. PATE, III, MICHAEL W. O'NEILL, and KEN B.
BARRETT, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Ming Li and Mitsuhiro Kimoto (Appellants) seek our review under 35 U.S.C. § 134 of the final rejection of claims 1, 5-14, 16-20, 22, 23, 25-29, and 32-34. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

THE INVENTION

Appellants' claimed invention pertains to micromachining using a laser beam. Spec. 1, para. [0002]. Claim 1, reproduced below, is representative of the subject matter on appeal.

1. A laser micromachining system for drilling holes in a work piece comprising:

a laser beam generator for directing a laser beam having a wavelength λ , along an optical path,

an image interpolating mask having an array of apertures, disposed in the optical path, for receiving the laser beam and forming a corresponding array of sub-beams of a first pitch size, the array of sub-beams being a sub-pattern of a reduced-size pattern formed on the work piece,

a demagnifier, disposed in the optical path, for forming the reduced-size pattern of the array of sub-beams on the work piece, the reduced-size pattern having a second pitch size, and

a translation stage coupled to the image interpolating mask for moving the image interpolating mask and the array of sub-beams in a perpendicular direction to the optical path such that the array of sub-beams is moved in a sequence to form the reduced-size pattern on the work piece,

wherein the second pitch size is less than λ and the first pitch size is greater than λ , and

when the laser beam is generated and the translation stage moves the array of sub-beams, the image interpolating mask is effective in forming an array of holes having the second pitch size.

THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

Smith	US 5,296,673	Mar. 22, 1994
Nakatani et al.	US 5,811,754	Sept. 22, 1998
Noddin	US 5,973,290	Oct. 26, 1999
Liu et al. (hereinafter "Liu '303")	US 6,433,303 B1	Aug. 13, 2002
Liu et al. (hereinafter "Liu '305")	US 6,433,305 B1	Aug. 13, 2002

The following Examiner's rejections are before us for review:

1. Claims 1, 5, 7-14, 17-20, 22-23, 25-29, and 32-34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Liu '303, Nakatani, Liu '305, and Smith; and
2. Claims 6 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Liu '303, Nakatani, Liu '305, Smith and Noddin.

These two rejections were made as new rejections in the Examiner's Answer, and differ from those in the Final Rejection at least by the addition of the Nakatani reference. *See* Ans. 8 ("another reference Nakatani et al. has been added to the rejection"). The Examiner does not repeat or discuss in the Answer the two Nakatani-less rejections from the Final Rejection, and thus we consider them to be withdrawn. *See* Manual of Patent Examining Procedure (MPEP) § 1207.02 (8th ed., Rev. 7, Jul. 2008).

OPINION

Appellants' claimed invention pertains to a laser drilling system and method where the laser beam is received by an element (*e.g.*, an image interpolating mask) thereby forming an array of sub-beams which, in turn, form an array of holes in the work piece. *See, e.g.*, Claim 1 (system); Claim

26 (method); Spec., figs. 1, 8. In order to form multiple arrays of holes in the work piece, the sub-beams are translated in a direction perpendicular to the direction of the optical path. To that end, Appellants' independent system claims 1, 5, 8, 11, 17, 20, and 23 recite "a translation stage" either for moving the image interpolating mask and the array of sub-beams or configured to move the array of sub-beams. Appellants' independent method claims 26 and 32 recite the step of translating the array of sub-beams.

The Examiner found that Liu '303 discloses much of Appellants' claimed invention (Ans. 4) but teaches translating the work piece rather than the sub-beams, *see id.* at 5 ("motion of the mask is not taught"). For the new grounds of rejection in the Answer, the Examiner relies on Nakatani for the disclosure of both a mask moving mechanism and a workpiece moving mechanism. *Id.* The Examiner reasons that:

It would have been obvious to one of ordinary skill in the art at the time of the invention to move the mask as taught by Nakatani et al. in the Liu et al. ('303) apparatus because the greater mobility would improve the circularity of the exit holes and reduce the taper of the holes. (Liu et al. '303 col. 6, lines 15-16).

Id. Appellants contend that the Examiner's articulated reasoning in support of the conclusion of obviousness lacks a rational underpinning. *E.g.*, Reply Br. 7-8.

In rejecting claims under 35 U.S.C. § 103(a), the examiner bears the initial burden of establishing a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992); *see also In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). The analysis supporting an obviousness rejection should contain articulated reasoning with some rational

underpinning. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (citations omitted) (cited approvingly in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)).

Appellants correctly note (Reply Br. 6) that the portion of Liu '303 upon which the Examiner bases the conclusion of obviousness, when read in its entirety, discloses that *a rotating half-wave plate or similar device* may be used to improve circularity and to possibly reduce hole taper. *See* Liu '303, col. 6, ll. 13-16. Appellants contend that this disclosure of Liu '303 has nothing to do with a greater mobility of laser sub-beams that may be achieved by adding a mask moving mechanism as disclosed by Nakatani. *See* Reply Br. 6. Appellants assert that the quarter-wave plate mentioned by Liu '303 pertains to controlling the polarization of the laser beam. *Id.* This assertion is consistent with Liu's description of a wave plate. *See* Liu '303, col. 2, l. 66 – col. 3, l. 2 (“The quarter-wave plate 113 changes the polarization of the laser beam from linear to circular polarization, which the inventors have determined is desirable for drilling round holes.”). The Examiner does not explain why translational mobility would be expected to improve hole circularity and reduce taper. Thus, we are left with the impression that the Examiner's reliance on Liu '303 as support for the conclusion of obviousness is misplaced.

In light of the above, we conclude that the Examiner has not made sufficient findings and has not articulated adequate reasoning with rational underpinning to explain why one having ordinary skill in the art would have combined the elements of, *inter alia*, Liu '303 and Nakatani so as to render obvious Appellants' claimed subject matter. As such, we cannot sustain the

rejection of claims 1, 5, 7-14, 17-20, 22-23, 25-29, and 32-34 as being unpatentable over Liu '303, Nakatani, Liu '305, and Smith.

The second rejection pertains to claims 6 and 16, which depend from independent claims 1 and 11, respectively. The Examiner found that Noddin discloses a crystal for harmonic generation, but does not rely on Noddin in any manner that cures the deficiency of the underlying rejection of claims 1 and 11. *See* Ans. 6-7, 9-10. As such, we also cannot sustain the rejection of claims 6 and 16 as unpatentable over Liu '303, Nakatani, Liu '305, Smith and Noddin.

DECISION

The decision of the Examiner to reject claims 1, 5-14, 16-20, 22, 23, 25-29, and 32-34 is reversed.

REVERSED

mls

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